

1 **3.3.11 NOISE**

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
<i>Would the project:</i>				
(a) Result in exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(b) Result in exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(c) Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(d) Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project that would result in a substantial nuisance to nearby sensitive receptors?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(e) For a project located within an airport land use plan area, or, where such a plan has not been adopted, in an area within two miles of a public airport or public use airport, would the project expose people residing or working in the area to excessive noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
(f) For a project located in the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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2 Fundamentals of Environmental Noise

3 Sound is mechanical energy transmitted by pressure waves through a medium such as
4 air. Noise can be defined as unwanted sound. Sound is characterized by various
5 parameters that include the rate of oscillation of sound waves (frequency), the speed of
6 propagation, and the pressure level or energy content (amplitude). In particular, the
7 sound pressure level has become the most common descriptor used to characterize the
8 loudness of an ambient sound level. Sound pressure level is measured in decibels
9 (dB), with 0 dB corresponding roughly to the threshold of human hearing, and 120 to
10 140 dB corresponding to the threshold of pain.

11 Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond
12 to the frequency of a particular sound. Typically, sound does not consist of a single
13 frequency, but rather a broad band of frequencies varying in levels of magnitude (sound
14 power). When all the audible frequencies of a sound are measured, a sound spectrum
15 is plotted consisting of a range of frequency spanning 20 to 20,000 Hz. The sound
16 pressure level, therefore, constitutes the additive force exerted by a sound
17 corresponding to the sound frequency/sound power level spectrum.

18 The typical human ear is not equally sensitive to all frequencies of the audible sound
19 spectrum. As a consequence, when assessing potential noise impacts, sound is
20 measured using an electronic filter that de-emphasizes the frequencies below 1,000 Hz
21 and above 5,000 Hz in a manner corresponding to the human ear's decreased
22 sensitivity to low and extremely high frequencies instead of the frequency mid-range.

This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted decibels (dBA).¹

Noise Exposure and Community Noise

An individual's noise exposure is a measure of the noise experienced by the individual over a period of time. A noise level is a measure of noise at a given instant in time. However, noise levels rarely persist consistently over a long period of time. Community noise varies continuously over time with respect to the contributing sound sources of the community noise environment. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise exposure, with individual contributors being unidentifiable. Background noise levels change throughout a typical day, but do so gradually, corresponding with the addition and subtraction of distant noise sources and atmospheric conditions. The addition of short duration single event noise sources (e.g., aircraft flyovers, motor vehicles, sirens) makes community noise constantly variable throughout a day.

These successive additions of sound to the community noise environment vary the community noise level from instant to instant requiring the measurement of noise exposure over a period of time to legitimately characterize a community noise environment and evaluate cumulative noise impacts. This time-varying characteristic of environmental noise is described using statistical noise descriptors. The noise descriptors used in this analysis are summarized below:

- **L_{eq}**: The equivalent sound level is used to describe noise over a specified period of time, in terms of a single numerical value. The L_{eq} is the constant sound level which would contain the same acoustic energy as the varying sound level, during the same time period (i.e., the average noise exposure level for the given time period).
- **L_{max}**: The instantaneous maximum noise level measured during the measurement period of interest.
- **L_{dn}**: The energy average of the A-weighted sound levels occurring during a 24-hour period, and which accounts for the greater sensitivity of most people to nighttime noise by weighting noise levels at night ("penalizing" nighttime noises). Noise between 10:00 p.m. and 7:00 a.m. is weighted (penalized) by adding 10 dBA to take into account the greater annoyance of nighttime noises.

¹ All noise levels reported herein reflect A-weighted decibels unless otherwise stated.

Effects of Noise on People

The effects of noise on people can be placed into three categories:

- Subjective effects of annoyance, nuisance, dissatisfaction;
- Interference with activities such as speech, sleep, learning; and
- Physiological effects such as hearing loss or sudden startling.

Environmental noise typically produces effects in the first two categories. Workers at industrial plants often experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise, or the corresponding reactions of annoyance and dissatisfaction. A wide variation exists in the individual thresholds of annoyance, and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way the new noise compares to the existing noise levels to which one has adapted, called the "ambient noise" level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived;
- Outside of the laboratory, a 3 dBA change is considered a just-perceivable difference when the change in noise is perceived but does not cause a human response;
- A change of at least 5 dBA is required before any noticeable change in human response would be expected; and
- A 10 dBA change is subjectively heard as approximately a doubling in loudness, and can cause an adverse response.

These relationships occur in part because of the logarithmic nature of sound and the decibel system. A ruler is a *linear* scale: it has marks on it corresponding to equal quantities of distance. One way of expressing this is to say that the ratio of successive intervals is equal to one. A *logarithmic* scale is different in that the ratio of successive intervals is not equal to one. Each interval on a logarithmic scale is some common

factor larger than the previous interval. A typical ratio is 10, so that the marks on the scale read: 1, 10, 100, 1,000, 10,000, etc., doubling the variable plotted on the x-axis. The human ear perceives sound in a non-linear fashion; hence, the decibel scale was developed. Because the decibel scale is based on logarithms, two noise sources do not combine in a simple additive fashion, rather they combine logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA.

Noise Attenuation and Addition of Sources

Point sources of noise, including stationary mobile sources such as idling vehicles or onsite construction equipment, attenuate (lessen) at a rate of 6.0 dBA to 7.5 dBA per doubling of distance from the source, depending upon the type of ground surface between the source and the receiver. Hard ground surfaces, such as parking lots and calm water, attenuate sound at a lesser rate (i.e., 6.0 dBA per doubling of distance) compared to the attenuation of sound between a source and receiver due to soft ground surfaces such as soft dirt, grass, or scattered bushes and trees (i.e., 7.5 dBA per doubling of distance). Widely distributed noises such as a large industrial facility spread over many acres or a street with moving vehicles (a "line" source) would typically attenuate at a lower rate of approximately 3.0 to 4.5 dBA per doubling distance from the source. However, the attenuation rate is also dependent upon the type of ground surface between the source and the receiver (Caltrans 1998).

Because decibels are represented on a logarithmic scale, noise levels of two sources cannot be added linearly for a combined noise level of the sources. Two noise sources that produce the same sound level, or differ by up to 1 dBA, will produce a combined sound level that is 3 dBA greater than the highest sound level of the individual sources. When two noise levels differ by 2 to 3 dBA, or 4 to 9 dBA, the combined sound level will be 2 dBA or 1 dBA, respectively, greater than the highest sound level of the individual sources (Caltrans 1998).

Fundamentals of Groundborne Vibration

Vibration is sound radiated through the ground. The ground motion caused by vibration is measured in the United States (U.S.) as vibration decibels (VdB). The background vibration velocity level in residential and educational areas is usually around 50 VdB. Groundborne vibration is normally perceptible to humans at approximately 65 VdB. A vibration velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels for most people.

Most perceptible indoor vibration is caused by sources within buildings, such as the operation of mechanical equipment, movement of people, or the slamming of doors. Typical outdoor sources of perceptible groundborne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the groundborne vibration from traffic is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. Construction activities can generate groundborne vibrations, which can pose a risk to nearby structures. Constant or transient vibrations can weaken structures, crack facades, and disturb occupants (FTA 2006).

Environmental Setting

Ambient Noise Environment

Ambient noise levels were not measured at the Marine Oil Terminal (MOT) or onshore vault of the proposed Project. Based on a recent site visit to the onshore vault and pipeline area, the average noise level (L_{eq}) at the nearby residences appeared to be typical of residential areas, and was estimated to be approximately 50 dBA (ESA 2008). It should be noted that a Union Pacific Railroad (UPRR) mainline lies along the shore adjacent to the onshore vault and nearby residences; however, no train passbys occurred during the site visit. The UPRR is primarily a freight line that generates high noise levels during passbys. The L_{dn} noise level created by trains operating along the UPRR has been estimated to be approximately 70 dBA at a distance of approximately 250 feet from the centerline of the railroad right-of-way (Contra Costa County 2005).

Sensitive Receptors

Human response to noise varies considerably from one individual to another. Effects of noise at various levels can include interference with sleep, concentration, and communication, and can cause physiological and psychological stress and hearing loss. Given these effects, some land uses are considered more sensitive to ambient noise levels than others. In general, residences, schools, hotels, hospitals, and nursing homes are considered to be the most sensitive to noise. Places such as churches, libraries, and cemeteries, where people tend to pray, study, and/or contemplate are also sensitive to noise. Commercial and industrial uses are considered the least noise-sensitive.

The MOT is more than 1 mile northwest of the nearest sensitive receptors, which are single-family residences in the unincorporated area of Rodeo. The onshore vault is approximately 250 feet from the closest residences in the city of Hercules at the Victory-by-the-Bay subdivision, and the eastern terminus of the onshore pipeline is within approximately 150 feet of the nearest residences at that subdivision.

Regulatory Setting

Federal and State

Federal, State, and local agencies regulate different aspects of environmental noise. Federal and State agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies. Local regulation of noise involves implementation of general plan policies and noise ordinance standards. Local general plans identify general principles intended to guide and influence development plans.

Local

Contra Costa County

The following policy from the Contra Costa County General Plan Noise Element may be applicable to the proposed Project (Contra Costa County 2005):

Policy 11-8: Construction activities shall be concentrated during the hours of the day that are not noise-sensitive for adjacent land uses and should be commissioned to occur during normal work hours of the day to provide relative quiet during the more sensitive evening and early morning periods.

City of Hercules

The Noise Element of the City of Hercules General Plan includes policies that address existing and foreseeable noise problems within the city (City of Hercules 1998). The following policies identified in the General Plan may be applicable to the proposed Project:

Policy 6: Control the level of noise at noise-sensitive land uses generated by construction activities through implementation of the following measures:

- For construction near noise-sensitive areas, as determined by the Community and Business Development Department, require that noisy construction activities (including truck traffic) be scheduled for periods, according to

construction permit to limit impact on adjacent residents or other sensitive receptors;

- Develop a construction schedule that minimizes potential cumulative construction noise impacts and accommodates particularly noise-sensitive periods for nearby land uses (e.g. for schools, churches, etc.);
- Where feasible, require that holes for driven piles be pre-drilled to reduce the level and duration of noise impacts;
- Where feasible, construct temporary solid noise barriers between source and sensitive receptor(s) to reduce offsite propagation of construction noise. This measure could reduce construction noise by up to 5 decibels; and
- Require internal combustion engines used for construction purposes to be equipped with a properly operating muffler of a type recommended by the manufacturer. Also, require impact tools to be shielded per manufacturer's specifications.

Policy 7: Reduce the level of truck-generated noise in residential areas through implementation of the following restrictions:

- The City shall restrict truck traffic in residential areas except for non-regular deliveries within the area or on designated truck routes. The City shall review and update the noise ordinance to limit truck traffic noise impacts to sensitive receptors; and
- The City shall post signs prohibiting trucks from using the proposed Claeyes Road extension except for local deliveries. All other trucks shall be required to use Sycamore Avenue to reach the Claeyes Road/SR4 interchange.

In addition to the city's noise element, section 7-2.608 of the city's Municipal Code is applicable to the proposed Project. The code requires that all work conducted under a City of Hercules Grading Permit that is within 500 feet of residential or commercial occupancies must be limited to the hours between 8 a.m. and 5 p.m. Monday through Friday, or as approved by the City Engineer (CPI 2008).

Impact Analysis and Mitigation

Impact Discussion

- (a) Construction activities within the city of Hercules that require a grading permit are limited to occur between the hours of 8 a.m. and 5 p.m. on weekdays per the city's municipal code and policies. Contra Costa County has a policy that requires construction activities to be concentrated during the hours of the day that are not noise-sensitive for adjacent land uses to provide relative quiet during

the more sensitive evening and early morning periods. To conform to this policy, Coscol has proposed to limit deconstruction activities at the MOT to normal workdays and hours (see APM-7).

As identified in Section 2.4, Deconstruction Schedule, and consistent with section 7-2.608 of the city of Hercules Municipal Code, deconstruction activities are proposed to occur between the hours of 8 a.m. and 5 p.m. Monday through Friday with the option to extend hours with a pre-approved variance from the city of Hercules Public Works Director, and on Saturdays when pre-approved by the Public Works Director. Therefore, deconstruction activities would not conflict with applicable noise ordinances and plans, and no impacts would occur. (No Impact)

- (b) Heavy equipment that would be used to deconstruct the proposed Project could generate perceptible vibration in the immediate vicinity of an active deconstruction site. The proposed activity most likely to cause groundborne vibration would result from jack hammering and other activities associated with the shore-side vault.

The level of groundborne vibration that could reach sensitive receptors would depend on the distance to the receptor, what equipment would be used, and the soil conditions surrounding the construction site. The vibration threshold of perception for pile-driving, which would produce much higher vibration levels than the equipment that would be associated with the proposed Project, would extend approximately 85 feet from the activities. Sensitive receptors such as the elderly, retired, ill, and other individuals that may stay home more often than average may become annoyed with pile driving when within 85 feet of the activities (Caltrans 2002). Potential structural impacts could result if extensive pile driving would occur within 25 feet or less of residences, buildings, or unreinforced structures (Caltrans 2002).

Because the proposed Project would use construction equipment that results in less vibration than pile driving and because the closest sensitive receptors would be at least 150 feet from the closest construction activities, vibration impacts associated with structural damage and residential annoyance would be less than significant. (Class III)

- (c) The proposed Project includes the deconstruction of the existing Coscol MOT and abandonment of the associated onshore vault and pipeline. The proposed Project does not include any long-term operations. Therefore, no long-term impacts would occur that could result in a substantial permanent increase in ambient noise levels. (No Impact)

- (d) Deconstruction and abandonment activities associated with the proposed Project would require a variety of equipment, including excavators, cranes, drills, saws, etc. The deconstruction period is estimated to last for 5-½ months. During this period, noise levels generated by operation of equipment would vary depending

on the particular type, number, and duration of use of the various pieces of equipment. As discussed above, construction activities are proposed to occur between the hours of 8 a.m. and 5 p.m. Monday through Friday, with the option to extend hours with a pre-approved variance from the city of Hercules Public Works Director, and on Saturdays when pre-approved by the Public Works Director.

Typical noise levels at 50 feet for some of the loudest pieces of construction equipment that would be required to deconstruct the proposed Project are listed in Table 3.3.11-1. The types of equipment that would be used for the offshore work would include cranes, excavators, concrete drill, wire saw, tug boats, anchor boats and crew boats, a generator, and a compressor. The noisiest piece of equipment required for the offshore work would be the concrete drill, which would have a noise level up to 99 dBA. Assuming that one other piece of equipment with the same noise level would operate at the same time, combined construction noise levels at 50 feet from the MOT site could be as loud as 102 dBA.

Table 3.3.11-1. Maximum Noise Levels of Proposed Deconstruction Equipment

Deconstruction Equipment	Noise Levels in dBA at 50 feet
Excavator with Shear	93
Steam Cleaner	93
Jack Hammer	99
Generator	90
Crane	88
Concrete Drill	99
Diamond Wire Saw	85
Tug Boat	82
Crew Boat	88

Source: Pacific Refining 2006.

The distance from the MOT to the nearest residential property line in Rodeo is approximately 1.04 miles. Assuming that the noise would attenuate over calm and smooth Bay water, maximum noise levels at the nearest property line would be approximately 61 dBA. Because Coscol has committed to conducting proposed deconstruction activities during the least noise sensitive time of the day and week (i.e., between 8 a.m. and 5 p.m., Monday through Friday, see also APM-7), these short-term noise levels represent a less than significant impact.

Impact NOI-1: Onshore Temporary Abandonment Activity Noise.

Proposed vault and pipeline abandonment activities could result in substantial short-term noise levels affecting nearby residences. (Potentially Significant, Class II)

Onshore abandonment activities would include demolition of a vault box and part of a concrete structure, and grouting of pipelines. Access for workers and equipment would be by boat and barge. Required equipment would include jackhammers, a cement mixer, a generator, a cement pump, a concrete saw, air compressors, a crew boat, and a crane (see Table 3.3.11-1). The noisiest pieces of equipment are the jack hammer and concrete drill, which would each have noise levels up to 99 dBA. Assuming that these pieces of equipment would operate concurrently, combined construction noise levels at 50 feet from onshore abandonment activities could be as loud as 102 dBA.

The closest distance from the proposed abandonment activities to the nearest residential property line is approximately 150 feet. Assuming attenuation over a soft surface, maximum noise levels at the nearest residences would be as high as 90 dBA and out to 1,000 feet from the proposed activities noise levels would be as high as 69 dBA. These noise levels could result in a substantial nuisance to nearby sensitive receptors. However, abandonment deconstruction activities would only occur for up to one week.

Coscol has committed to implementing **APM-7** (see Section 2.5), which incorporates noise impact reduction specifications into the proposed Project. However, to strengthen the intent of **APM-7**, implementation of Mitigation Measures **MM NOI-1a** and **NOI-1b** would also be required.

Mitigation Measures for Impact NOI-1:

MM NOI-1a. Public Notification. Coscol shall establish a public outreach program to notify all residences within 1,000 feet of proposed vault and pipeline abandonment activities. Notification shall identify the proposed daily deconstruction schedule and the dates when the onshore abandonment activities would occur, and shall include the name and contact information of a Coscol representative for questions.

MM NOI-1b. Noise Barriers. Coscol shall install portable noise barriers (wooden or concrete) or curtains that block the line of sight between nearby residences and the abandonment activities. In addition, all compressors and other small stationary equipment shall be oriented so that the

1 equipment exhaust would face towards the west, away from nearby
2 residences.

3 Rationale for Mitigation

4 Implementation of this public outreach program would result in the notification of nearby
5 residences and the installation of portable noise barriers or curtains would reduce the
6 short-term noise nuisance impact to less than significant.

7 (e) The proposed Project sites are not located within two miles of a public use airport
8 and would not expose people to excessive airport noise. No impact would occur.
9 (No Impact)

10 (f) The proposed Project sites are not located within the vicinity of a private airstrip
11 and would not expose people to excessive airport noise. No impact would occur.
12 (No Impact)